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| Notice of Allowability | Application No. | Applicant(s) | |
| | 10/801,704 | KATAOKA ET AL. | |
| | Examiner | Art Unit | |
| | Marianne L. Padgett | 1762 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 3/17/04, 5/11/04, 6/1/04 & phone conversations of 7/12/07 & 9/14/07.
2. ☒ The allowed claim(s) is/are 1-8.
3. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date <u>5/11/2004</u> 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | <ol style="list-style-type: none"> 5. <input type="checkbox"/> Notice of Informal Patent Application 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date <u>20070914</u> 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance 9. <input checked="" type="checkbox"/> Other <u>(Oral)Restriction</u>. |
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1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-8, drawn to a method of making a solar cell module with a metal oxide photovoltaic element that has been treated with water & irradiated with electromagnetic waves to effect contact angle & sealed with a resin layer, classified in class 427, subclass 532+, or for lamp irradiation sources 553+.
 - II. Claim 9, drawn to a solar cell module with a metal oxide photovoltaic element sealed with a resin layer, classified in class 136, subclass 252+.

2. The inventions are independent or distinct, each from the other because:

Inventions group I and group II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made via other techniques, such as employing other means for insuring wetting of the resin sealing layer, such as chemical activation, use of flame treatment use of particle irradiation, etc., as well as choice of a resin sealant material which is unaffected by use of electromagnetic waves off the metal oxide surface.

3. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art due to their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

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Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

4. During a telephone conversation with Damond Vadnais on 7/10/2007 & 7/12/2007 a provisional election was made with traverse to prosecute the invention of group I, method claims 1-8. Claim 9 was withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

5. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

6. Authorization for this examiner's amendment was given in a telephone interview with Damond Vadnais on 9/14/2007 & 9/17/2007.

In the claims:

cancel product claim 9, nonelected with traverse.

7. The following is an examiner's statement of reasons for allowance: the closest prior art found, as exemplified by Kazuhito Hashimoto et al. (5,939,194), directed to making semiconductor photocatalyst (metal oxides, inclusive of titanium oxides, zinc oxide, etc. highly hydrophilic (e.g. contact angle down to 0°) via irradiation (metal halide lamps, mercury lamps, xenon lamps, i.e. includes UV, most preferred intensities not less than 0.1 mW/cm²) in the presence of water on the surface, such that water molecules are physically absorbed in the vicinity of hydroxyl groups on the surface upon

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photoexcitation of the photocatalyst, where the irradiation uses light having higher energy than the band gap between the upper end of the valence band & lower and of the conduction than of the photocatalyst (abstract; figures 1-2, 4 & 8-11; col. 1, lines 16-65; col. 2, lines 9-31 & 38-60; col. 3, lines 1-33+; col. 4, lines 5-29; col. 5, lines 19-35+ col. 6, lines 19-67, especially 20-41; col. 8, lines 54-60; examples, especially col. 10, lines 15-44; col. 11, lines 21-41 & col. 12, lines 35-57) & Kataoka et al. (5,530,264 or 5,582,653: abstract; figures; col. 3, lines 4-30; col. 4, lines 51-68; col. 6, lines 1-col. 7, lines 31, especially 12-26; col. 8, lines 28-52; col. 12, lines 25-35 & 50-col. 13, lines 15+; & col. 14, lines 48-col. 15, lines 13) or Ishikawa et al. (5,656,098: abstract; figures; summary; col. 4, lines 53-col. 5, lines 49; col. 7, lines 50-col. 8, lines 7; example 1 in col. 14 & example 5 in col. 19) or Yuichi Hashimoto et al. (5,344,501 or 5,354,385) or Hartman et al. (4,663,829) or Yaba by et al. (5,149,351), all directed to encapsulating or sealing with resin, photovoltaic elements having a transparent conductive metal oxide (ITO, SnO₂, In₂O₃, TiO₂, etc.) as the outer surface, provide all aspects of the claimed invention, **except** a reason to apply the aqueous irradiation treatment of Kazuhito Hashimoto et al. to any of the solar cell sealing &/or encapsulation processes of the prior art. Note that Kazuhito Hashimoto et al., while listing their processes use for solar cell cover related uses (col. 9, lines 31-32) among the numerous potential applications, is directed towards their treated surface being the outer surface & having self-cleaning properties due to the hydrophilicity induced in the presence of water & light. While the references relating to solar cell encapsulation & sealing discussed the importance of adhesion of the resin layer to the transparent electrode surface, it is addressed via composition employed, such as mixing coupling agents with the resin applied to the metal oxide layer, or choice of resin as an adhesion layer (thermoplastic resins: EVA, EMA, EEA...), with no suggestion of modifying the properties of the metal oxide to improve adhesion of the resin, which was applied via various solution (spraying, etc.) or hotmelt (laminating, extrusion) techniques.

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Review of related prior art, which deposits polymeric material onto metal oxide surfaces, did not find a linking teaching. For example, while Komiya (EP 0 475 441 A2; abstract; page 3, lines 42-58 & page 4, lines 18-55) is laminating extruded coatings, such as ethylene/vinyl acetate (EVA) copolymer resins, onto metal oxide barrier layers to serve as a sealing medium, they teach making adhesion sufficient by appropriate choice of temperature at which to apply the resin. The patents to Tropsha et al. (5,919,328: col. 2, lines 4-64), Shaw et al. (5,725,909: abstract; figures; col. 3, lines 15-20 & 35-40; col. 3, lines 11-44 & 58-col. 4, lines 68+; col. 5, lines 25-col. 6, lines 65) & Yializis (6,214,422 B1: abstract; figures; col. 2, lines 5-54; col. 4, lines 45-67; col. 20-21), who all discuss multilayer barrier coating depositions, such as polymer/metal oxide(s)/polymer, inclusive of polymers such as acrylates, have general teachings on improving adhesion between layers via plasma &/or flame treatment, but when specifically discussed, employ the pretreatments for deposition of metal oxide on to polymer, or [metal] oxide onto metal oxide, with it further noted that these polymer layers applied on to metal oxide surfaces are vapor deposited, thus these references also do not provide a teaching that would suggest the need to hydrophilize the metal oxide surfaces, such as those in the solar cell encapsulation processes. Bergbreiter et al. (5,728,431) suggest pretreating metallic substrates so that the surface is a metal oxide, before contacting the surface with polymeric solutions or dispersions to form layers thereof, thus suggesting known desirability of metal oxide surfaces for polymeric depositions.

Hayakawa et al. (6,191,062 B1) provides teachings related to those of Kazuhito Hashimoto et al., where photocatalytic metal oxide particles in a resin matrix provide deodorant & antimicrobial activities, as discussed in K. Hashimoto et al., but due to the presence of appropriate electron trapping metals (dopants) therewith, the metal oxide particles may be covered with resin, however that resin is just an extension of the resin matrix material & not a separately deposited layer. Burrows et al. (2003/0017371 A1) also has metal oxide particles, such as ITO, in a carrier resin, which is treated with UV to increase its conductivity, then coated with a resin protective layer (abstract; figure 2; [0035]), however there is no

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suggestion that the UV treatments in any way affect the adhesion of the protective layer & UV treatments are not in the presence of water. Johnson et al. (6,679,978 B2) & Ohtsu et al. (6,793,980 B2 & 2003/0143437 A1) have further teachings on UV irradiation of photocatalytic metal oxide materials for self-cleaning properties of surfaces thereof, again lacking any suggestion of using the material & process in a pretreatment for subsequent coating. Tanaka et al. (4201598) teach improving certain electrical characteristics of semiconductor devices containing various metal oxide compositions via irradiation with various types of radiation beams, but does not suggest a use for adhesion of successive layers.

The Japanese patent to Yokota Masahisa et al. (JP 2001-180, 145, with English abstract & machine translation) teach using a photocatalytic layer inclusive of metal oxides that are hydrophobic as a printing plate, so that latent images are provided by irradiation with light of higher energy than the band gap energy of the photocatalyst, where the hydrophilic/hydrophobic differentiation of the image is used to create the ink images for transfer, but which is not used to create a permanent adhesion interface, nor employed with polymers such as used in the solar cell encapsulation/sealing references. Kato et al. (6183923 B1 & JP.2000-168254 A) have analogous teachings to Masahisa et al., but where the non-imaged area is turned hydrophilic via UV radiation. Takahashi et al. (7000/0128416 A1) & Nakamura et al. (2005/0095356 A1), have further teachings of interest concerning hydrophilic treatments of metal oxides via UV irradiation, but are not prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 8:30 a.m. to 4:30 p.m.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

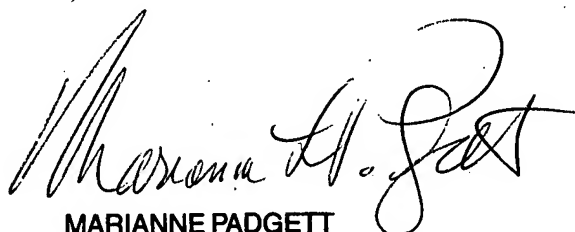
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MLP/dictation software

7/(10&13)/2007

9/14/2007

9/17/2007



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PRIMARY EXAMINER